

**Nitrates and Purchased Hay**  
***A CSU Beef Team Brief***

Marvin Reynolds  
County Director, Colorado State University Extension, Pueblo County  
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Any purchased hay should be tested for nitrates. Alfalfa and grass hay may be an exception. Nitrates accumulate in plants during drought conditions or when water is restricted during irrigation. Since we don't know the actual growing conditions of purchased feed, spending \$10-15 for a nitrate test is much cheaper than losing a \$1,500 cow or \$600 calf. Often, losses of animals from nitrates don't stop at one. Several may die before symptoms are recognized.

Nitrates are a normal part of forages. When they accumulate to too high a level in the forage they can become toxic. The disease nitrates cause is called nitrate poisoning. Nitrates found in forages are normally converted by the digestive system to nitrite, and the nitrite is converted to ammonia. The ammonia is then converted to protein by the bacteria in the rumen.

When large quantities of nitrates are ingested, the rumen can't convert it all to ammonia. Nitrite accumulates in the rumen. Nitrite is 10 times more toxic to cattle as nitrate. Nitrite is absorbed into red blood cells and combines with hemoglobin to form methemoglobin. Methemoglobin cannot transport oxygen in the blood as efficiently as hemoglobin. The animal's heart rate and respiration increase, the blood and tissue of the animal take on a blue to chocolate brown tinge, muscle tremors can develop, staggering occurs and the animal eventually suffocates.

Nitrate poisonings often occur with the feeding of Sudan or sorghum –Sudan hybrid or pearl millet feeds. There are other feeds that can accumulate nitrates such as perennial fescue or johnsongrass. Also, weeds such as pigweed, kochia, mustard, nightshade and lamb's quarters accumulate nitrates.

There are ways that high nitrate feeds can be fed to cattle and other livestock. High nitrate feeds can be diluted with low nitrate feeds including concentrates. Also, animals that are in different stages of production are able to handle different levels of nitrates. Pregnant cows can handle fewer nitrates than open cows as high nitrates can cause abortions.

Nitrates can be reported in a forage nitrate test in several different ways. They can be reported as nitrate (NO<sub>3</sub>), potassium nitrate (KNO<sub>3</sub>), or nitrate-nitrogen (NO<sub>3</sub>-N). There may be other ways to report nitrate levels as well. Be sure you know the way it is reported. A chart showing the safe and dangerous levels should be provided with the test results.

If nitrates are reported to you and you want to understand them in a different reporting method, there are conversions that will put the numbers in a form you want to work with.

To find these conversions and more information about nitrate poisoning of livestock, call your local Extension Office or on the internet you can go to [www.ext.colostate.edu](http://www.ext.colostate.edu) and in the search box enter 1.610 or enter Nitrate Poisoning. This will redirect you so you can find the CSU Extension fact sheet on Nitrate Poisoning.